Macroinvertebrate Production on Floodplain Snags

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| Expectation: | A statistically significant increase in annual production of macroinvertebrates utilizing floodplain snags. |
| Author: | Joseph W. Koebel Jr., South Florida Water Management District |
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| Relevant Endpoint(s): | Restoration - Biological Integrity- Productivity<br>Restoration – System Functional Integrity – Habitat Quality<br>Restoration – System Functional Integrity – Energy Flow Dynamics |
| Baseline Condition: | Within the channelized Kissimmee River system, the river channel is isolated from the floodplain. Floodplain inundation patterns are directly related to local rainfall events. During the baseline sampling period, water depths rarely exceeded 20 cm in Pool C broadleaf marsh, and never exceeded 5 cm in Pool A broadleaf marsh. These depths were insufficient to completely inundate floodplain woody debris, which made it unavailable to aquatic invertebrates as a substrate throughout most of the baseline period.<br><br>Macroinvertebrates utilizing floodplain snags were sampled during three quarterly sampling events in Pool C between August 1995 and May 1997. Annual production was estimated as 3.2 $g/m^2/yr$. Over 78% of total floodplain snag production was attributed to five taxa; Oligochaeta (36.3%), Acarina (20.4%), *Fittkauimyia* sp. (10.5%), Collembola (6%), and *Belostoma* sp. (5.2%). |
| Reference Condition: | Historical data on annual production of macroinvertebrates on woody debris of the Kissimmee River floodplain are not available. In fact, production estimates for floodplain snag-dwelling macroinvertebrates are rare ( Smock et al. 1985; Gladdon and Smock 1990; Smock et al. 1992). The stated expectation has been hypothesized based on expectations for restored floodplain hydroperiods, continuous inundation of existing woody debris, and colonization of floodplain snags by aquatic macroinvertebrates. Thorp et al. (1985) found densities of Ephemeroptera ranged from 60 – 420 individuals/$^2$ and coleopteran densities ranged from 45 – 330 individuals/$m^2$ on woody debris within a southeastern cypress-tupelo swamp. Smock et al. (1985) found *Stenonema modestum* (Ephemeroptera: Heptageniidae) to occur in low numbers (mean density = 140 individuals/$m^2$), attain low mean annual biomass (27 $mg/m^2$), and have a low rate of production (275 $mg/m^2/yr$) within a southeastern blackwater swamp. Chironomids and oligochaetes can occur in moderate to high numbers. Thorp et al. (1985) found chironomid densities ranged from 1155 – 4980 individuals/$m^2$ and oligochaetes densities ranged from 15 – 2940 individuals/$m^2$. Smock et al. (1985) found mean annual densities, biomass, and annual production of chironomids ranged from 475 – 3056 individuals/$m^2$, 6 – 18 $mg/m^2$, and 200 – 561 $mg/m^2/yr$, respectively. Although often abundant, mean annual biomass of chironomids and oligochaetes typically is low; however, biomass turnover rates for chironomids can be high (> 50; Benke et al. 1984). The combination of moderate to high density, low mean annual biomass and potentially high biomass turnover rates for these taxa |

likely will result in moderate levels of annual production. Larger taxa (primarily amphipods, isopods, and odonates) likely will occur in low numbers (< 150 individuals/$m^2$) with moderate mean annual biomass (< 50 mg/$m^2$), and low biomass turnover rates (5 – 10), also resulting in moderate levels of annual production.

Mechanism Relating Restoration To Reference Conditions:

Restored long-term floodplain inundation frequencies with water depth > 40 cm will be sufficient to inundate floodplain woody debris, and be the impetus for colonization, persistence, and productivity of a floodplain snag-dwelling invertebrate fauna.

Time Course for Restoration:

Restoration of floodplain snag-dwelling invertebrate community structure and production likely will be rapid in existing broadleaf marsh habitats that currently support dead woody debris. Although some dead woody debris exists within broadleaf marsh habitats, large amounts of wood are expected to be deposited within this habitat following restored inundation patterns. Death and decay of existing wax myrtle (*Myrica cerifera*) and other non-wetland trees and shrubs is likely to occur following 1-2 years of continuous inundation. Additionally, woody debris is expected to be transported from the river channel and deposited on the floodplain during periods of high discharge and floodplain inundation. Increased water levels (> 40 cm) and prolonged hydroperiods in these areas will permanently submerge much of the existing woody debris. Colonization by invertebrates can be as short as one week, with representative densities and functional feeding group composition occurring within 3 – 5 weeks (Thorp et al. 1985).

Adjustments for External Constraints:

Because some woody debris already exists in some areas to be restored, and taxa likely to colonize and contribute to an increase in invertebrate densities and standing stock biomass currently exist within the Kissimmee basin, there are no external constraints which would delay or preclude increased invertebrate production on floodplain woody debris. However, delays in implementing a regulation schedule that provides appropriate floodplain inundation frequencies likely will delay colonization rates and production of floodplain snag-dwelling invertebrates.

Changes in taxonomic composition of woody debris over time should have no impact on colonization rates and taxonomic composition of macroinvertebrates inhabiting floodplain snags.

Means of Evaluation:

Sampling of floodplain snags within broadleaf marsh habitats likely will commence one month following implementation of the upper basin regulation schedule resulting in floodplain inundation to a depth > 40 cm. Post-restoration sampling methods will be identical to those outlined in Anderson et al. (1998), and include quarterly (at a minimum) collection of replicate (5, minimally) floodplain snag samples from randomly selected locations within Pools A and C broadleaf marsh. Samples will be analyzed for invertebrate species identity, species richness, mean annual density, mean standing stock biomass, and functional feeding group composition. Production will be calculated using the instantaneous growth rate method (IGR). Results will be compared to the stated expectation.

# REFERENCES


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